

**STAFF SUMMARY SHEET**

	TO	ACTION	SIGNATURE (Surname), GRADE AND DATE		TO	ACTION	SIGNATURE (Surname), GRADE AND DATE
1	DFMI Dept Head	Approve	<i>David Donnelly 17 Mar 13</i>	6			
2	DFER	Review	<i>Thomas GL 17 Mar 13</i>	7		<i>a few types</i>	
3	DFMI	Action		8			
4				9			
5				10			
SURNAME OF ACTION OFFICER AND GRADE Dr Talbot, AD-24			SYMBOL DFMI	PHONE 333-9425		TYPIST'S INITIALS bt	SUSPENSE DATE
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**SUMMARY**

1. PURPOSE: To provide security and policy review of the attached documents prior to public release.
2. BACKGROUND: Cadets Joshua Huckabee, Gordan Lang, Joseph Shields, Branden Shoenfeld, and Vincent Jovene were Military and Strategic Studies majors enrolled in our department's MSS 498 capstone course and their essays in this issue of Airman Scholar Journal represent their senior thesis work from Spring 2012. The final article is a book review by Cadet Edward Boylan, an MSS student in a senior core course. Note that the first article in this issue (Thomas Drohan, "Core Relevance at the Air Force Academy") was previously cleared for public release for a conference presentation in 2011.

Titles: 2) "Active Learning and the Rising Generation of Air Force Officers," 3) "Hands on Keyboard: Considerations for a Cyber Weapons School," 4) "Seizing the Ultimate High Ground: Weaponizing Space," 5) "An Airplane for all Seasons," 6) "Personnel Recovery: CV-22 Expansion Pack;" and 7) a book review of "War Made New."

Issue overview: Cadet Joshua Huckabee argues for improved simulation scenarios in the Cadet Battle Lab, DFMIs premier networked classroom. Cadet Gordan Lang follows with his proposal for a joint military cyber school to train the rising generation of cyber warriors. Cadet Joseph Shields argues the merits of weaponizing space. Cadet Brandon Shoenfeld argues that the Air Force should purchase the A-29 Super Tucano over the AT-6 Texan II built by a US-based company, and interestingly, the Air Force just announced the A-29 as its choice, validating Brandon's argument. Cadet Vincent Jovene also make an airframe argument for Combat Search and Rescue, advocating the purchase of CV-22 Osprey's to augment the HH-50 rescue fleet. Lastly, our book review by Cadet Edward Boylan covers a primary text used in MSS 416, in which he was enrolled as a Humanities major.

Release Information: release for web-based publication in the e-journal entitled: Airman Scholar Journal (ASJ)

Recommended Distribution Statement: Distribution A, Approved for public release, distribution unlimited.

3. RECOMMENDATION: Sign Approve/Review blocks above indicating documents are suitable for public release. Suitability is based solely on the document being unclassified, not jeopardizing DOD interests, nor inaccurately portraying official policy.



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# PERSONNEL RECOVERY

## THE CV-22 OSPREY EXPANSION PACK

VINCENT T. JOVENE III

Time has a funny way of changing things. In the words of Italian Air Marshall Giulio Douhet, an aggressive advocate for airpower in the early twentieth century, “Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur.”<sup>1</sup> What works well in today’s fights will not necessarily work well in tomorrow’s. Most of the armed conflicts of the twentieth century were fought conventionally, and the US dominated the battle-space. As a result, adversaries quickly realized that they could fight more effectively and cause significantly more damage to the US by conducting irregular warfare. Operations that were once relatively simple are now complex. These changes have greatly affected missions and operations of US combat search and rescue forces. Fighter pilots are in less danger of being shot down behind enemy lines; instead, terrorists are snatching any Americans they can and hiding them in insurgent safe houses. The US is currently, and will likely continue to be, engaged in multiple irregular conflicts around the world. The myriad of locations and types of engagements present several hurdles to Combat Search and Rescue (CSAR) forces’ capabilities. These diverse challenges prompt the question: does the US Air Force have the most effec-

tive aircraft inventory to perform personnel recovery missions? The short answer is that given the wide range of conflicts the US confronts,

defined as, “the sum of military, diplomatic, and civil efforts to prepare for and execute the recovery and reintegration of isolated

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*The US is renowned for taking care of its own and refuses to allow the enemy any opportunity to take advantage of Americans. Therefore, personnel recovery is extremely important to the military's top leaders.*

the Air Force does not have the most effective inventory and must acquire more versatile aircraft to most effectively perform personnel recovery.

### Why an Inventory Upgrade?

Today’s Air Force relies almost solely on HH-60 Pave Hawks and HC-130 Kings for the bulk of personnel recovery missions. While HH-60s and HC-130s are valuable rescue assets, the HH-60 has, “acute performance limitations in areas such as speed, range, carrying capacity, and reliability that are evident in harsh environments such as Afghanistan and in Iraq.”<sup>2</sup> These weaknesses are a serious disadvantage in many of today’s conflicts. The Air Force needs a more robust, versatile selection of faster aircraft that can operate over longer distances, at higher altitudes, and in tighter spaces.

Personnel recovery and CSAR are not the same thing and a distinction should be made between the two. Personnel recovery is

personnel.”<sup>3</sup> Isolated personnel are, “those US military, DOD civilians, and DOD contractor personnel who are separated...from their unit while participating in a US-sponsored military activity or mission and who are...in a situation where they must survive, evade, resist, or escape.”<sup>4</sup> Personnel recovery essentially applies to the rescue of anyone that is separated from their unit. CSAR is a tactic of personnel recovery; it is an active location and recovery process used in high-threat situations to return isolated personnel to friendly control. Not every case of isolated personnel will require a CSAR mission or CSAR assets; oftentimes a single, small aircraft will suffice.

The US military’s most valuable asset is its people. In today’s irregular conflicts, terrorists know that if they can capture Americans, they can exploit their prisoners in ways

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that can cause strategic damage to the US while furthering their own objectives. The US is renowned for taking care of its own and refuses to allow the enemy any opportunity to take advantage of Americans. Therefore, personnel recovery is extremely important to the military's top leaders. As Joint Publication 3-50 states, "preserving the lives of those participating in a US-sponsored activity or mission is one of the highest priorities of the Department of Defense."<sup>5</sup>

Air Force holds the responsibility for providing a dedicated personnel-recovery force.

Major Chad Sterr, an Air Force combat rescue officer, declares that while rescue forces are appreciated at the tactical level for bringing everyone home, "airpower advocates often fail to understand [the rescue mission's] inherent strategic value as part of the broader personnel recovery...function." Sterr says that the Air Force has, "developed the rescue force into the service's [personnel recovery] experts..."

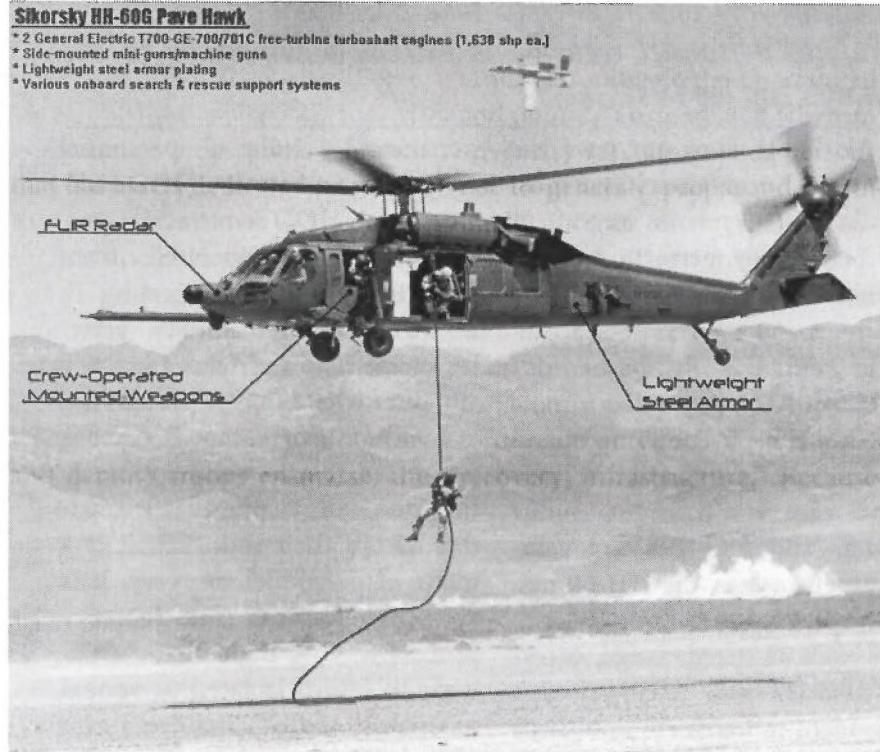
of the negative implications surrounding isolated personnel, the Air Force needs the most effective aircraft platforms for personnel recovery for the widest range of situations.

## THE OPTIONS

### *Osprey versus Pave Hawk*

The uncertainty involved in irregular warfare contributes a significant amount of added confusion to the fog and friction of war. In the unpredictable combat environment frequently encountered today, speed is of vital importance. Denying the enemy an opportunity to exploit an isolated American, preserving the lives of wounded troops, and building rapport with civilians by aiding their injured are all missions where the capability to rapidly engage and disengage can mitigate that confusion. When things go wrong in the combat environment, rapid arrival of a rescue force can make the difference between success and failure. While the Air Force currently relies on the HH-60 Pave Hawk to perform the personnel recovery mission, it also has in its inventory the CV-22 Osprey, presently employed for special operations missions. If the Air Force expands its personnel recovery inventory to include the CV-22, it arguably could more effectively carry out personnel recovery missions. Major John Groves, an Air Force Special Operations pilot, says that the CV-22's, "unique capabilities of the aircraft, particularly range and speed, qualify it for the [personnel recovery] role."<sup>6</sup>

The Osprey is a hybrid between fixed-wing and rotary-wing aircraft, enabling it to execute missions that would normally require



Among the Army, Air Force, Marine Corps, and Navy, the Air Force is the only military branch that has assets dedicated primarily to personnel recovery. The other service branches do train some of their units to perform rescue missions; for example, the Marines have Tactical Recovery of Aircraft and Personnel teams. However, when the US military mobilizes and deploys troops en masse, the

[and] can mitigate the operational and political costs created when an adversary exploits isolated personnel to generate propaganda, gain intelligence, or restrict their physical freedom of action or maneuver."<sup>6</sup> Sterr further points out that "the increased presence of Americans abroad and the dynamics of irregular warfare require the US to develop an effective [personnel recovery] infrastructure."<sup>7</sup> Because

both types of aircraft.<sup>9</sup> Its tilting propellers allow it to take-off and land vertically like a helicopter, but also to fly with the speed, range, and efficiency of a fixed-wing turboprop. This combination of characteristics gives the CV-22 the capabilities to travel at distances and speeds that a helicopter could not, and to land in locations that a fixed wing aircraft could not. The newer CV-22 has advanced avionics systems and terrain following radar for bad weather conditions, both of which aid the situational awareness of the crew.<sup>10</sup>

The CV-22 is similar in size to the workhorse HH-60. This hybrid aircraft possesses a wingspan of 84 feet and 57 feet long, with a propeller blade diameter of 38 feet for each propeller. In comparison, the HH-60 has a rotor diameter of 53 feet, and length of 64 feet. However, beyond the dimensional similarities, the CV-22 and HH-60 have little in common. Maximum vertical take-off weights for the CV-22 and HH-60 are 52,870 pounds and 22,000 pounds, respectively. If the CV-22 does a rolling take-off, it can carry 60,500 pounds. Both aircraft's flight crews consist of two pilots and two crew chiefs. The CV-22 can carry twenty-four troops in seats or thirty-two on the floor while the HH-60 carries only twelve troops. The CV-22 cruises at 241 knots, 82 knots faster than the HH-60, and has a ceiling of 25,000 feet, 11,000 feet above the HH-60's ceiling. While both aircraft have refueling capabilities, the CV-22's unrefueled range is nearly twice that of the HH-60's approximately 500 nautical miles.<sup>11</sup>

Besides the capability to fly at a high ceiling, the CV-22 can climb rapidly out of range of dangerous

rockets and automatic weapons that pose the greatest threat to helicopters. Also, Special Operations Command has stated that

is attached to the CV-22—at \$89 million, it is much more expensive than the \$40 million HH-60.<sup>15</sup> The Air Force also has a much smaller

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when the propellers are rotated forward, the CV-22 is 75 percent quieter than rotary-wing aircraft, an attribute useful for either clandestine or recovery missions.<sup>12</sup> The CV-22 is certainly a formidable aircraft. It can race in and out of battle going twice the distance, at almost twice the speed, carrying double the payload, as the HH-60.

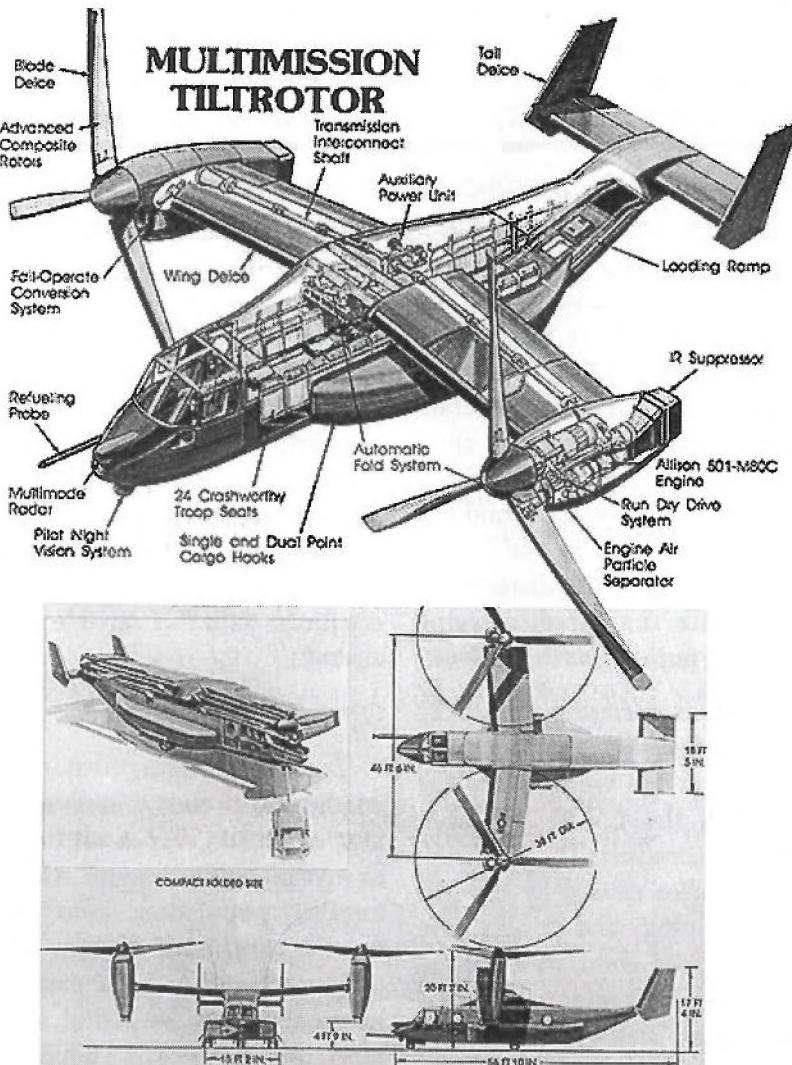
Despite its strengths, the CV-22 is not without its shortcomings. A project in the works since the late 1980s, the CV-22 has been harshly scrutinized following deadly crashes caused by the tilt-rotor technology and doubts have been expressed about its ability to perform key helicopter maneuvers. Groves states, "in the event of a dual engine failure, the [aircraft] settles much faster than a normal helicopter, making autorotational descent and landing extremely difficult."<sup>13</sup> The CV-22 also lacks the kind of armament normally seen on comparable aircraft: it only has one tail-mounted machine gun instead of two door-mounted machine guns. This lack of armament, combined with a poor ability to autorotate, makes leaders hesitant to take the aircraft into combat zones.<sup>14</sup>

Although the Air Force has gained invaluable experience with the CV-22 while conducting special operations missions in Iraq and Afghanistan, the hybrid aircraft is still less battle-proven than the older HH-60. A high-price tag

fleet of only 17 CV-22s, which are used solely by Air Force Special Operations Command, compared to nearly 100 HH-60s. Regardless, the CV-22 has exceptional capabilities that can bridge gaps left by the HH-60s, and the Air Force could at least augment its personnel recovery forces with this capable hybrid aircraft.

### Operating Incognito

The ever-changing battle-spaces encountered today demonstrate that American troops will deploy to myriad environments. Altitude, terrain, population, and other factors contribute to how effective an aircraft is for a particular mission. Operations in high mountains, such as those in Afghanistan, can unnecessarily hinder a mission if the aircraft is nearing its ceiling. A helicopter, while the best choice for recovery where there is no room for a fixed-wing aircraft to land, struggles at high altitudes. Thick forests, hills, and other natural obstacles restrict the length of runways making it difficult for refueling aircraft to have access to deployment locations. In remote locations, unless aerial refuel capabilities are at hand, helicopters cannot travel the necessary distances to execute missions. Indigenous populations may be loyal to Americans or they may side with the enemy; in the latter situation, a loud, overly-conspicuous aircraft draws unwanted attention to the



already high-stress recovery. These factors further demonstrate the need for a wider selection of aircraft that are able to mitigate the fog and friction of combat.

The CV-22 helps to mitigate these functions. It has an operating ceiling comparable to that of a fixed-wing aircraft, so it can fly at the hazardous altitudes in mountainous terrains. The longer range of the CV-22, to an extent, solves the refueling problem, and its quieter engines draw less attention. However, the CV-22 is still very obviously a military aircraft, which, depending on the mission, will not always constitute the most

preferable platform. Fortunately, there is a solution to the problem of unwanted visibility: light-weight, fixed-wing aircraft.

Currently, the only fixed-wing platform dedicated to personnel recovery is the HC-130 King. The Air Force has thirty-six such aircraft divided between active duty, reserves, and air guard. This variant of the C-130 provides support and refueling capabilities for personnel recovery forces. The HC-130 is much larger than the CV-22 and the HH-60, measuring 98 feet long with a wingspan of 132 feet, and carries a payload of 34,000 pounds. This fixed-wing aircraft has a much

longer reach than the rotary-wing platforms—4,000 miles with a ceiling of 33,000 feet at a speed of 251 knots.<sup>16</sup> A 6000-foot long runway is the minimum distance needed for take-off, and although the HC-130 can land on a strip 3000 feet long, that point is moot if it cannot take-off again.<sup>17</sup> During landings, every C-130's engines go in reverse and make a good deal of noise, which draws unwanted attention to the aircraft. This attention could increase the risk of a rescue mission. The HC-130's size and noise levels do not make it the most desirable aircraft when discretion is the better part of valor.<sup>18</sup>

Captain Kyle Porter, an Air Force combat systems specialist, argues a personnel recovery squadron that includes light-weight, fixed-wing aircraft among its assets can more effectively accomplish a wider range of missions.<sup>19</sup> Porter offers the following example: if a remotely piloted aircraft with a sensitive payload goes down in Africa, it is most effective to send a recovery team on a light-weight, inconspicuous aircraft. Locals are accustomed to seeing small aircraft carrying hunters, doctors, and explorers, so that a lightweight aircraft landing on a dirt road is likely to go unnoticed.<sup>20</sup>

Adding to their appeal, light-weight aircraft also require significantly less distance for take-offs and landings. The smallest aircraft proposed by Captain Porter, the A-1C, needs only one pilot, 500 feet for take-off and 200 feet for landing. The largest light-weight aircraft, the DHC-6 Twin Otter, can also be flown by only one pilot and requires just 1200 feet for take-offs and landings. Light-weight aircraft can also be employed on mis-

sions that normally fall under the HC-130s responsibility: "overland and water search; light airdrop or resupply; communication relay, spotting or marking isolated persons; low visibility insertion or extraction; nontraditional intelligence, surveillance, and reconnaissance; on-scene commander; and humanitarian relief."<sup>21</sup>

The major disadvantage of using a lightweight aircraft is its significantly reduced payload. An A-1C carries only 925 pounds; the DHC-6 carries 3,250 pounds. The lighter, smaller aircraft can go more places and draw less attention at the cost of carrying smaller payloads. Still, these light-weight aircraft have impressive ranges for their diminutive sizes. The A-1C can fly 800 miles with a ceiling of 20,000 feet going 113 knots.<sup>22</sup> Depending on whether an auxiliary fuel tank is onboard and the size of the payload, the DHC-6

reach \$4,800 an hour.<sup>25</sup> A Twin Otter costs significantly less at \$300 an hour.<sup>26</sup>

### The Alternatives

Given the Air Force's need for a more effective personnel recovery inventory and the capabilities of the CV-22 and the lightweight, fixed wing aircraft, there are two different alternatives the Air Force can pursue. The first, more costly, alternative offers the widest selection of assets:

Purchase CV-22s specifically dedicated to personnel recovery and invest in various lightweight aircraft. If the Air Force possesses a diverse inventory of aircraft dedicated to personnel recovery, it can more likely conduct virtually any rescue scenario in any location. As Captain Porter says, "having an option to tailor aircraft types and deployment footprints to match the operating environment can enhance mission effectiveness, decreasing risk from threats and realizing monetary and logistical savings."<sup>27</sup>

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*A blended deployment package including HH-60s, CV-22s, HC-130s, and lightweight, fixed-wing aircraft would provide the most comprehensive coverage for a wide range of potential personnel recovery missions.*

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has a range of 644-903 miles with a ceiling of 25,000 feet, also going 113 knots.<sup>23</sup>

Because of their small size, these lightweight aircraft carry two other major advantages: low price tags and lower operating costs. The Air Force is being forced to do more with less. When possible, it makes more sense to use a smaller and cheaper aircraft to perform a rescue conserving valuable resources. Most light-weight, fixed-wing aircraft cost no more than \$500,000.<sup>24</sup> Porter points out that fuel costs for an HC-130 can

A blended deployment package including HH-60s, CV-22s, HC-130s, and lightweight, fixed-wing aircraft would provide the most comprehensive coverage for a wide range of potential personnel recovery missions. Given the unique capabilities of these various platforms, vital rescue missions in different conditions could be conducted with a greater sense of confidence and higher probability of success. The fuel-hauling HC-130 could transport supplies to forward locations from which the lightweight, fixed-wing platforms could operate. For low-visibility,

low-impact rescues, the light-weight, fixed-wing assets make the most sense, thereby permitting rotary-wing aircraft to remain on alert for more hazardous, complicated missions. Essentially, the unique strengths of one asset in the blended deployment package serve to offset the weaknesses in its sister platforms. This maximized combination of dedicated personnel recovery assets is a highly efficient solution for enhancing and modernizing the Air Force's personnel recovery aircraft inventory.

The second alternative the Air Force could pursue is to simply purchase a variety of lightweight, fixed-wing platforms to augment the current inventory of HH-60s and HC-130s.

Although the CV-22 offers very attractive qualities for personnel recovery missions, the time-proven HH-60 can accomplish most of the missions the CV-22 would undertake. The Air Force already compensates for the HH-60's shorter range with aerial refueling services provided by HC-130s. The HH-60 is a safer, considering its ability to autorotate, though it is also aging in comparison to the CV-22. Lightweight, fixed wing aircraft can ease the load on HH-60s by carrying out inconspicuous rescues in low-threat environments. If it purchases only lightweight aircraft, the Air Force can obtain a greater number of assets to cover different areas and augment current personnel recovery forces than if the same amount of money was spent to purchase both CV-22s and light-weight platforms. Buying only lightweight, fixed-wing aircraft gives the Air Force the largest number of rescue assets for personnel recovery, though operat-

ing range remains an obstacle for reaching forces deep in enemy territory.

Of the two possible alternatives, the author suggests the Air Force select the first. How the Air Force acquires the new CV-22s and lightweight, fixed-wing aircraft is also important. The Air Force should purchase the CV-22s and the lightweight aircraft in equal proportions every year so as to have a well-rounded and balanced personnel recovery force. Focusing on only one or the other would unnecessarily create gaps in capability. While augmenting current assets solely with lightweight platforms would be the cheaper option, the CV-22's range and STOL capabilities are invaluable and should be applied to personnel recovery.

Because of the amount of time it will take to create a full-strength personnel recovery inventory in the Air Force, special operations forces units that possess CV-22 assets should, when possible, assist rescue forces. As a corollary, it would be mutually beneficial if personnel recovery forces assisted other organizations in their assigned missions. Otherwise idle personnel recovery aircraft assets could be used to move troops, deliver supplies, and aid indigenous populations. In peacetime, personnel recovery forces can maintain their skills by assisting victims of natural disasters and by conducting search and rescue missions for lost hikers or skiers. Maintaining individual and crew proficiency is just as important as strong rescue platforms. Accordingly, recovery forces should not idly sit by when opportunities are at hand to practice their skills.

## Conclusion

Personnel recovery is a very high priority when the US military goes to war. People are precious, and the US seeks to mitigate the risks that its fighting men and women will be captured and exploited.<sup>28</sup> Nevertheless, every military operation involves a certain degree of danger, and just because there are significant threats to personnel safety does not mean that the US will never deploy troops. Therefore, personnel recovery is an important mitigating factor to the dangers posed by combat.

The American people rely on commanders to bring home their family members, friends, and loved ones, and the US does not passively allow terrorists to abuse captured Americans. The US Air Force thus requires the most effective possible personnel recovery force. Purchasing new personnel recovery aircraft will be expensive, but it is likely the US will continue to be engaged in conflicts around the world. When its most valuable assets are in danger, the US cannot afford to be without the most robust and versatile inventory possible. Although the current fleet of HH-60s and HC-130s are presently considered adequate for accomplishing personnel recovery missions, Air Force capabilities will be significantly enhanced by the acquisition of new aircraft that can more effectively perform these strategically significant tasks, particularly as the US finds itself in more remote regions like Afghanistan.

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1 Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (Washington: Office of Air Force History, 1983), 5.

2 John Marshall Groves, "A Combat Search and Rescue (CSAR) Role for the CV-22: It's Coming, Get Ready" (master's thesis, Marine Corps Command and Staff College, 2008), 5.

3 Chairman, US Joint Chiefs of Staff, *Personnel Recovery*, final coordination, Joint Publication (JP) 3-50 (Washington, DC: CJCS, 5 January 2007), I-1.

4 JP 3-50, *Joint Doctrine for Personnel Recovery* (Second Draft), (Washington, DC: Office of the Joint Chiefs of Staff, 11 May 2005), I-1.

5 JP 3-50, *Personnel Recovery*, (final coordination copy), I-1.

6 Chad Sterr, "Strategic Rescue: Vectoring Airpower Advocates to Embrace the Real Value of Personnel Recovery," *Air & Space Power Journal* 25, no. 3 (Fall 2011): 26-27.

7 Ibid, 29-30.

8 Groves, A (CSAR) *Role for the CV-22*, 16.

9 US Air Force, "CV-22 Osprey," September 15, 2011, under "Factsheets," <http://www.af.mil/information/factsheets/factsheet.asp?id=3668>

10 Groves, A (CSAR) *Role for the CV-22*, 17.

11 US Air Force, "HH-60G Pave Hawk," October 20, 2011, under "Factsheets," <http://www.af.mil/information/factsheets/factsheet.asp?id=107>

12 Otto Kreisher, "Finally, the Osprey," *AirForce-Magazine.com*, February 2009, under "Magazine Archive," <http://www.airforce-magazine.com/MagazineArchive/Pages/2009/February%202009/0209Osprey.aspx>

13 Groves, A (CSAR) *Role for the CV-22*, 17.

14 Ibid, 18.

15 US Air Force, "CV-22 Osprey," September 15, 2011, under "Factsheets," <http://www.af.mil/information/factsheets/factsheet.asp?id=3668>

16 US Air Force, "HC-130P/N King," January 1, 2010, under "Factsheets," <http://www.af.mil/information/factsheets/factsheet.asp?fsID=106>

17 Kyle J. Porter, "Air Force Fixed-Wing Rescue: A Multifaceted Approach

- for Full-Spectrum Personnel Recovery," *Air & Space Power Journal* 25, no. 3 (Fall 2011): 42.
- 18 Ibid, 42.
  - 19 Ibid, 44.
  - 20 Ibid, 37.
  - 21 Ibid, 44.
  - 22 Aviat Aircraft, "Husky A-1C," Aviat Aircraft Inc, <http://www.aviataircraft.com/hspcs.html>
  - 23 US Department of Commerce, "DeHavilland Twin Otter (DHC-6),"
  - National Oceanic and Atmospheric Administration, [http://www.aoc.noaa.gov/aircraft\\_otter.htm](http://www.aoc.noaa.gov/aircraft_otter.htm)
  - 24 Porter, "Air Force Fixed-Wing Rescue," 43.
  - 25 Ibid, 39.
  - 26 Dornier Seaplane Company, "Direct Operating Costs," Dornier Seaplane Company, <http://www.dornierseaplane.com/content/direct-operating-costs>
  - 27 Porter, "Air Force Fixed-Wing Rescue," 39.
  - 28 The US is fearful of experiencing another Mogadishu. The Black Hawk Down incident and capture of CWO Mike Durant scared the US out of Somalia in the early 1990s and the US has been apprehensive of committing ground forces to any volatile military operations since then. A Modern Cuban Missile Crisis?

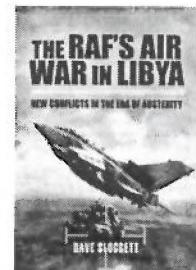


### Airpower Studies

1. Colin Gray, *Airpower for Strategic Effect*, Air University Press, 2012.
2. John Andreas Olsen, *Global Air Power*, Potomac Books, Inc., 2011.

### Historical Analysis

3. Antony Beevor, *The Second World War*, W&N, 2012.
4. Dave Sloggett, *The RAF's Air War in Libya: New Conflicts in the Era of Austerity*, Pen & Sword Books, Ltd., 2012.



### Leadership and the Moral Component

5. Peter Gray, *The Leadership, Direction and Legitimacy of the RAF Bomber Offensive from Inception to 1945*, Continuum, 2012.
6. Andrew Mackay and Steve Tatham, *Behavioural Conflict: Why Understanding People and Their Motives Will Prove Decisive in Future Conflicts*, Military Studies Press, 2011.
7. Stephen Bungay, *The Art of Action: How Leaders Close the Gaps Between Plans, Actions and Results*, Nicholas Brealey Publ., 2010.

### Future Operating Environment

8. Hew Strachan and Sibylle Scheipers, *The Changing Charachter of War*, Oxford Univ. Press, 2011.
9. Donald Sull, *The Upside of Turbulence: Seizing an Opportunity in an Uncertain World*, Collins Business, 2009.
10. Joseph Nye, *The Future of Power: And Use in the Twenty-First Century*, Public Affairs, 2012